

wafer position while the robot is at its nominal centering position, and V indicates the sensor output value when the process wafer is at the nominal wafer position and the sensor is thus partially blocked. For the illustrated embodiment, $l_{\max} = 10$ mm, $l_{\min} = 0$ mm, $V_{\max} = 5$ V, and $V_{\min} = 0$, so that

$$\Delta = 2(V_{\text{ref}} - V)$$

IN THE CLAIMS:

Please amend the Claims 10, 17, 19-23 and 37 as indicated in the clean versions below:

10. (Amended) The method of Claim 9, wherein each of the at least two proportionate sensors are partially blocked by a leading edge of the reference substrate at a second nominal robot position when the reference substrate data is recorded, and further comprising recording additional reference substrate data when each of the at least two proportionate sensors are partially blocked by a trailing edge of the reference substrate.

17. (Amended) The method of Claim 16, wherein calculating drift parameters (x, y) of the process substrate from the nominal substrate position comprises

calculating linear deviation Δ of an interception point of the process substrate edge relative to the reference substrate interception point for each of the at least two proportionate sensors;

calculating a lateral spacing f of each sensor from an axis of robot translation; and

calculating the drift parameters (x, y) from the linear deviations Δ , f and the substrate diameter d .

19. (Amended) The method of Claim 17, wherein, for each sensor,

$$\Delta = \frac{l_{\max} - l_{\min}}{V_{\max} - V_{\min}} (V_{\text{ref}} - V)$$

where l_{\max} and l_{\min} represent maximum and minimum sensor lengths blocked by the substrate, V_{\max} and V_{\min} represent the output value of the sensors when l_{\max} and l_{\min} are blocked, V_{ref} indicates the sensor output value when the substrate is at the nominal position, and V indicates the sensor output value when the process substrate is at the nominal substrate position.

20. (Amended) The method of Claim 19, wherein (x, y) are calculated using the following formulae:

$$x = \frac{1}{2} \left[f_L - f_R + \sqrt{\left(\frac{d}{s}\right)^2 - 1} \left(\Delta_L - \Delta_R + \sqrt{\left(\frac{d}{2}\right)^2 - f_L^2} - \sqrt{\left(\frac{d}{2}\right)^2 - f_R^2} \right) \right]$$

$$y = \frac{1}{2} \left[-\sqrt{\left(\frac{d}{s}\right)^2 - 1} (f_L + f_R) + \left(\Delta_L + \Delta_R + \sqrt{\left(\frac{d}{2}\right)^2 - f_L^2} + \sqrt{\left(\frac{d}{2}\right)^2 - f_R^2} \right) \right]$$

$$s^2 = (f_L + f_R)^2 + \left(\Delta_L - \Delta_R + \sqrt{\left(\frac{d}{2}\right)^2 - f_L^2} - \sqrt{\left(\frac{d}{2}\right)^2 - f_R^2} \right)^2$$

wherein d represents the substrate diameter, Δ_L and Δ_R are the substrate deviations of the two sensors, and f_L and f_R are the lateral spacing from left and right sensors, respectively, to an axis of robot translation.

21. (Amended) The method of Claim 20, further comprising determining the nominal robot position by:

- moving the robot with the reference substrate to the nominal robot position;
- rotating the reference substrate through an angle θ_g ;
- calculating an x_g displacement resulting from rotating through the angle θ_g using the formula for x in Claim 20; and
- obtaining a value g by substituting the value of x_g obtained into the following formula:

$$g = \frac{x_g}{\sin \theta_g}$$